

- 20 -

CLAIMS

1. A Hop-FED structure comprising:
 - a. a substrate;
 - b. emitter areas on said substrate;
 - 5 c. a hop-plate disposed over said substrate and emitter areas with a surface of the hop-plate opposing said substrate and emitter areas; and
 - d. an electrically conductive layer formed on said surface of the hop-plate.
- 10 2. A Hop-FED structure according to claim 1, wherein said surface is formed with projections that space the remainder of the hop-plate from said substrate and emitter areas.
3. A Hop-FED structure according to claim 2, wherein said projections are formed as pillars or ribs.
- 15 4. A Hop-FED structure according to claim 2 or 3, wherein said electrically conductive layer is provided on said projections.
5. A Hop-FED structure according to claim 2 or 3, wherein said electrically conductive layer is not provided on said projections.
6. A Hop-FED structure according to any of the preceding claims,
20 wherein said electrically conductive layer is of a material of high electrical resistivity.

- 21 -

7. A Hop-FED structure according to claim 6, wherein said material has a surface resistivity in the range 10^7 to 10^{11} ohms per square.
8. A Hop-FED structure according to claim 7, wherein said material has a surface resistivity in the range 10^8 to 10^{10} ohms per square.
- 5 9. A Hop-FED structure according to claim 8, wherein said material has a surface resistivity of substantially 10^9 ohms per square.
10. A Hop-FED structure according to claim 6, 7, 8 or 9, wherein said material is selected from the group comprising amorphous silicon and silver doped silica.
- 10 11. A Hop-FED structure according to any of the preceding claims, wherein said electrically conductive layer extends partially within the channels of the hop-plate.
12. A Hop-FED structure according to any of the preceding claims, wherein said electrically conductive layer is connected to means for holding said
15 layer at a predetermined potential.
13. A Hop-FED structure according to claim 1 and substantially as hereinbefore described with reference to the accompanying drawings.
14. A Hop-FED structure comprising:
- a. a cathode with emitter areas;
 - 20 b. an anode arranged to receive electrons emitted from the cathode;
 - c. a hop-plate disposed between the cathode and anode;

- 22 -

- d. spacer means arranged to provide a space between said cathode and anode; and
- e. gettering material disposed in said space.

15. A Hop-FED structure according to claim 14, wherein said spacer means
5 comprises projections provided on one or both faces of said hop-plate.

16. A Hop-FED structure according to claim 14 or 15, further comprising a flue-plate between said hop-plate and anode.

17. A Hop-FED structure according to claim 16, wherein said spacer means comprises projections provided on one or both faces of said flue-plate.

10 18. A Hop-FED structure according to claim 15 or 17, wherein said spacer means are formed as pillars or ribs on said hop-plate and/or flue-plate.

19. A Hop-FED structure according to any of claims 14 to 18, wherein said gettering material forms a distributed getter.

20. A Hop-FED structure according to any of claims 14 to 19, wherein said
15 gettering material comprises a non-evaporated getter.

21. A Hop-FED structure according to claim 20, wherein said gettering material comprises an alloy containing at least one Group IV metal.

22. A Hop-FED structure according to any of claims 14 to 21 and also according to any of claims 1 to 13.

20 23. A Hop-FED structure according to any of claims 14 to 22, wherein the structure is sealed by a glass-frit seal that is spaced from said gettering material,

- 23 -

and the structure further comprises a conductive member that is compatible with said glass-frit and extends from outside the structure, through said glass-frit seal and to said gettering material, to which it is electrically connected.

24. A Hop-FED structure according to claim 14 and substantially as
5 hereinbefore described with reference to the accompanying drawings.

25. A method of manufacturing a hop-plate for a Hop-FED structure, the method comprising the steps of:

- a. applying an electrically conductive layer to a surface of a main body;
- 10 b. applying a sacrificial layer to said electrically conductive layer;
- c. applying a protective layer with apertures to said sacrificial layer;
- d. eroding portions of said sacrificial layer, electrically conductive layer and main body through said apertures so as to form channels through said main body at the locations of said apertures, said
15 protective layer otherwise protecting said sacrificial layer, electrically conductive layer and main body from erosion;
- e. applying a secondary emission layer to said sacrificial layer and main body, including said channels; and
- 20 f. removing said sacrificial layer with contiguous portions of said secondary emission layer to expose said electrically conductive layer and said channels coated with said secondary emission layer.

26. A method according to claim 25, wherein said Hop-FED structure is in accordance with any of claims 1 to 24.

- 24 -

27. A method according to claim 25 or 26, wherein said sacrificial layer comprises vacuum-evaporated or sputter-coated aluminium.
28. A method according to claim 25, 26 or 27, wherein said protective layer comprises a photoresist material.
- 5 29. A method according to any of claims 25 to 28, wherein said erosion step is carried out by powder blasting.
30. A method according to claim 29, wherein said blasting utilises alumina abrasive media.
31. A method according to any of claims 25 to 30, wherein secondary
10 emission layer comprises alumina.
32. A method according to any of claims 25 to 31, further comprising the step of applying a hop-electrode to said main body.
33. A method of manufacturing a Hop-FED structure according to any of claims 14 to 24, the method comprising the steps of:
- 15 a. applying a protective layer with apertures to a surface of a main body of a hop-plate or flue-plate;
- b. eroding portions of said main body through said apertures, said protective layer otherwise protecting said main body from erosion; and
- 20 c. removing said protective layer to define at locations under said protective layer projections to serve as said spacer means.

- 25 -

34. A method according to claim 33, wherein said protective layer comprises a photoresist material.
35. A method according to claim 33 or 34, wherein said erosion step is carried out by powder blasting.
- 5 36. A method according to claim 35, wherein said blasting utilises alumina abrasive media.
37. A method according to claim 33 or 34, wherein said erosion step is carried out by etching.
38. A method of manufacturing a Hop-FED structure according to any of
10 claims 14 to 24, the method comprising the steps of applying a metal film in a pattern to a main body of a hop-plate or flue-plate and electroplating said metal film to define projections that serve as said spacer means.
39. A method according to claim 38, wherein said metal film is applied by sputter coating.
- 15 40. A method of manufacturing a Hop-FED structure according to any of claims 14 to 24, the method comprising the steps of applying multiple layers of glass frit to a main body of a hop-plate or flue-plate to define projections that serve as said spacer means.
41. A method according to claim 40, wherein said layers of glass frit are
20 applied by a printing process.
42. A method according to any of claims 25 to 41, wherein said main body is of glass.

- 26 -

43. A method of manufacturing a hop-plate for a Hop-FED structure, the method being substantially as hereinbefore described with reference to the accompanying drawings.